EXH. CAK-1Tr2
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: CATHERINE A. KOCH

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-22____** **Docket UG-22____**

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF

CATHERINE A. KOCH

ON BEHALF OF PUGET SOUND ENERGY

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PUGET SOUND ENERGY

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I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy.

A. My name is Catherine A. Koch. My business address is 355 110th Ave. NE, Bellevue, Washington, 98004-5591. I am the Director of Planning with Puget Sound Energy ("PSE" or the "Company").

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

A. Yes, I have. It is Exh. CAK-2.

Q. What are your duties as the Director of Planning for PSE?

A. I am responsible for the long-term and short-term planning of the electric and gas delivery system infrastructure including electric distribution and transmission planning, asset management, grid modernization strategy and enablement, gas distribution and transmission planning, integrity management, and pipeline modernization strategy. I am also responsible for real estate procurement and management, local municipal relations including franchise obligations, and street and land use permitting activities.

Q. What is the scope of your testimony in this proceeding?

A. My testimony describes PSE's continued focus on providing safe, clean, and reliable service to customers as the foundation for the transmission and distribution work performed by PSE. I explain the need for the work and the benefits to PSE's customers since the 2019 general rate case.

In my testimony I first describe the robust planning process that PSE uses to optimize the transmission and distribution investments that benefit customers. I then introduce the transmission and distribution work PSE performed from January 1, 2019, the end of the test year in PSE's 2019 general rate case, through the test year for this case ending June 30, 2021; the proforma period ending December 31, 2021; the gap period ending December 31, 2022; and the multiyear rate plan ending December 31, 2025. More details regarding PSE's transmission and distribution work during these periods are described in exhibits to my testimony, including Customer and Public Safety in Exh. CAK-3, Customer Growth and Service Needs in Exh. CAK-4, Grid Modernization in Exh. CAK-5, and Pipeline Modernization in Exh. CAK-6. My testimony and Exh. CAK-7 contain PSE's renewed request that the Commission approve PSE's Advanced Metering Infrastructure ("AMI") investment following the Commission's 2019 general rate case order. Finally, I also discuss the storm events that qualified for the storm deferral mechanism in Exh. CAK-8. All of the programs and projects I describe fall under PSE's "Operations" business unit.

Q. How is your testimony related to other witness' testimony?

A. The context of my testimony is provided by the Prefiled Direct Testimony of Dan'l R. Koch, Exh. DRK-1T, which describes PSE's efforts to support clean energy for customers today and tomorrow and provides a high-level view of PSE's Operations philosophy driven by internal and external trends, policies, key objectives, and processes. In addition, eight other PSE witnesses have testimony that relates to my testimony as follows:

- The Prefiled Direct Testimony of Roque B. Bamba, Exh. RBB-1T, describes PSE's processes for implementing Operations programs and projects as well as the Operations major projects with an overall spend greater than $10 million for which PSE is requesting rate recovery in this case;
- The Prefiled Direct Testimony of Sanem I. Sergici, Exh. SIS-1T, introduces and describes the AMI Report prepared by The Brattle Group that demonstrates the projected benefits resulting from PSE's maximization of its AMI system;
- The Prefiled Direct Testimony of Suzanne L. Tamayo, Exh. SLT-1T, describes the Information Technology ("IT") assets that support PSE's Operations work;
- The Prefiled Direct Testimony of Dawn M. Reyes, Exh. DMR-1T, provides details regarding the implementation of the Operations Training Center that I discuss the need for;
- The Prefiled Direct Testimony of Mark N. Lowry, Exh. MNL-1T, introduces PSE's new and updated performance metrics of which I discuss the rationale for changes relating to Operations;
- The Prefiled Direct Testimony of Joshua J. Jacobs, Exh. JJJ-1T, discusses PSE's Clean Energy Implementation Plan ("CEIP") and methane emission reduction efforts of which I discuss the specific Operations plans and investments;
- The Prefiled Direct Testimony of Joshua A. Kensok, Exh. JAK-1T, describes the maturation of the corporate capital planning process

of which I discuss how Operations supports this corporate process; and

- The Prefiled Direct Testimony of Susan E. Free, Exh. SEF-1T, which describes the plant closings forecasted and revenue requirement of which I discuss the Operations plans in support of.

Q. Please summarize the rate recovery PSE is seeking in this proceeding for its Operations expenditures.

A. PSE is seeking recovery of investments made since the last rate case, between January 1, 2019 and June 30, 2021, which is $783 million in electric transmission and distribution infrastructure, $665 million in gas distribution infrastructure, and $14.6 million in infrastructure that is common, supporting both electric and gas systems.

Additionally, PSE is seeking forward rate recovery of projected, programmatic, and specific investments to be made between July 1, 2021 and December 31, 2025. Table 1 shows the five-year capital expense and the corresponding forecasted plant closings for each revenue rate period.

Table 1. July 1, 2021 through December 31, 2025 Operations Capital Expense and Plant Closings

Revenue Rate Period	Electric ($ Millions)		Gas ($ Millions)		Common ($ Millions)	
	Capital expense	Plant closings	Capital expense	Plant closings	Capital expense	Plant closings
7/2021-12/2021	202.4	141.2	130.0	100.6	3.4	1.4
2022	446.9	~~190.3~~ 340.8	284.8	~~218.4~~ 470.6	3.5	43.5
2023	648.5	~~374.7~~ 554	266.0	~~290.6~~ 306.5	2.5	0.9
2024	623.1	~~307.9~~ 735	241.3	~~220.2~~ 234.8	2.5	~~1.0~~ 6
2025	654.7	~~346.7~~ 522.7	235.1	~~241.1~~ 256.9	0.9	0.9

Table 1 is provided as a bridge between the financial numbers discussed in my testimony relative to the five-year capital expense (plan), as introduced in Kensok, Exh. JAK-1T, and the financial numbers and forecasted plant closings discussed in Free, Exh. SEF-1T. My testimony discusses Operations' plans in the context of the five-year capital plan as that is how Operations' business plans are developed and managed to deliver benefits. In Table 1, the capital expense compared to the plant closings on an annual basis is fairly close, annually within 97 percent, as much of the work is programmatic short lifecycle work, meaning it can be initiated and placed in service (plant closed) within one or two years. In all years, the capital expense is higher than the plant closing, generally reflecting engineering expense for work that will be placed in service in the following year.

Q. Is there anything else that PSE is requesting as part of your testimony?

A. Yes. In section V, I request the Commission eliminate several legacy methodologies relating to reporting SAIDI and SAIFI in PSE's Reliability Report per Docket UE-110060 and WAC 480-100-393, and I explain why adding and revising several SAIDI and SAIFI methodologies is appropriate.

II. PSE'S APPROACH TO MANAGING AND DEVELOPING ITS ELECTRIC AND GAS SYSTEMS

A. Managing and Developing Electric and Gas System Overview

Q. What is PSE's approach to managing and developing its electric and gas utility systems?

A. PSE's fundamental approach and over-arching goal in managing and developing its electric and natural gas utility systems is to provide safe, clean, and reliable systems for its customers. PSE's electric system must transform quickly to support clean energy that requires an interactive and bi-directional power flow, and a system that can integrate distributed energy resources ("DERs") and the latest clean-energy customer technologies (e.g., electric vehicles, rooftop solar, and battery storage) while enhancing overall resiliency to natural disaster events resulting from climate change. In my testimony, I describe the investments PSE has made and is planning to make to meet the challenges of a modern, customer-focused grid.

Similarly, PSE's natural gas system requires a continued emphasis on maintenance, repair, and reliability upgrades for safe and uninterrupted service, implementing industry best practices for the ongoing operation and maintenance of the delivery system. It too will need to quickly adapt to clean energy transformation through the decarbonization of the natural gas system.

Q. Do PSE's long-range plans recognize the increased challenges of a changing delivery system?

A. Yes, they do. PSE's long range Integrated Resource Plans ("IRP") set the resource needs over the next 24 years. PSE's electric IRP contains detailed plans for transforming PSE's electric delivery system to the grid of the future, complying with new laws, such as Washington's Clean Energy Transformation Act ("CETA"), and meeting the changing demands of its customers. PSE's gas IRP details the natural gas resource needs and PSE's plans for a delivery system that provides continued safe and reliable service.

Q. Is PSE's Operations planning focused on customers?

A. Yes, it is. As described below, PSE's planning processes are designed with a customer focus and PSE is committed to continued enhancement of those processes to benefit its gas and electric customers well into the future.

B. Delivery System Investment Management Overview

Q. How are PSE's delivery system investments structured?

A. PSE separates its delivery system investments into two categories: discretionary and non-discretionary. Discretionary investments are those where PSE makes decisions regarding scope, schedule, and budget. PSE can evaluate risks and tradeoffs of these investments as part of PSE's annual business planning and budget allocation process. In contrast, non-discretionary investments are dictated by others or driven by requirements relative to timing and or scope outside of PSE's direct control. PSE's annual business planning process aims at providing sufficient resources so that non-discretionary work is managed in accordance with good utility practice. Non-discretionary work takes priority over discretionary work.

Discretionary and non-discretionary work can be broken into planned and unplanned categories. Planned investments allow time to consider alternatives when deciding how and when to complete the work in accordance with optimization and corporate business planning processes. An example of this is PSE's Cable Remediation program where PSE has flexibility to determine the optimal scope and timing to achieve benefits. Unplanned investments generally must be addressed immediately or within a short timeframe, with little time to consider alternatives or for which there are no alternatives. An example of this is PSE's Emergency Outage Repair requiring the replacement of failed or damaged equipment to resolve immediate safety concerns and restore operations and power for customers.

These categories help to demonstrate why flexibility is needed in the Operations planning process. For example, investment plans and in-year adjustments fund unplanned non-discretionary work first, such as emergencies or increased customer requests, followed by planned non-discretionary work such as compliance with regulations. Planned discretionary investments, such as grid modernization projects, are adjusted as needed to accommodate non-discretionary variability.

Q. Please describe how PSE is organized to plan and manage work.

A. There is significant and necessary collaboration within PSE to plan and manage work. For planned discretionary work, PSE's Planning organization, which I oversee, is responsible for monitoring, identifying, and analyzing delivery system needs and scoping solutions. PSE has a robust Project Management Office ("PMO"), which directs the oversight of projects and programs, ensuring strong governance and execution. Suzanne L. Tamayo leads the IT PMO and Roque B. Bamba leads the Operations PMO. As such, Mr. Bamba, is responsible for executing Operations' discretionary plans, and performing project and program management to deliver plans on schedule, scope, and budget. Mr. Bamba describes PSE's project and program implementation process in Exh. RBB-1T.

For planned non-discretionary work, like customer requests and public improvement projects, PSE's Customer and System Projects ("C&SP") organization responds to these types of requests. This organization is responsible for overseeing project execution through close out following a similar, but typically simpler, lifecycle processes as compared to the Operations PMO. Should project complexity increase, the Operations PMO may take over project execution, such as for large Sound Transit relocation projects.

For unplanned non-discretionary investments such as outage or leak management, PSE's Gas Operations and Electric Operations organizations oversee trends and investments associated with work that is performed following established procedures for repairs and completion and leverage established service provider contract arrangement to forecast and manage costs.

C. Planned Investments

Q. Please describe how PSE manages execution of a planned project for the best outcome for customers.

A. Bamba, Exh. RBB-1T, provides a detailed discussion regarding the Operations PMO function and how planned programs and projects are managed. "Projects" are individual discrete investments, such as a tree wire upgrade, whereas a "program" is a collection of projects to achieve a common objective or purpose such as the many asset plans that collectively improve system wide reliability performance. Whether through the PMO or other organizations such as C&SP, most projects follow a similar process with varying degrees of complexity. At a high level, a project manager is assigned to the project and manages it from inception through closeout. This project manager drives the "triple constraints" of schedule, cost, and scope, coordinating with external and internal team members across engineering, procurement, and construction activities. They orchestrate designs developed by engineers which are peer reviewed and approved for compliance with standards, accuracy, and cost effectiveness. Designs are reviewed so that any constructability challenges are proactively addressed prior to the start of construction. Project managers deploy construction management personnel to monitor compliance with the engineering design and address field issues that arise.

Q. Please describe how PSE manages execution of a planned program to provide the best outcome for customers.

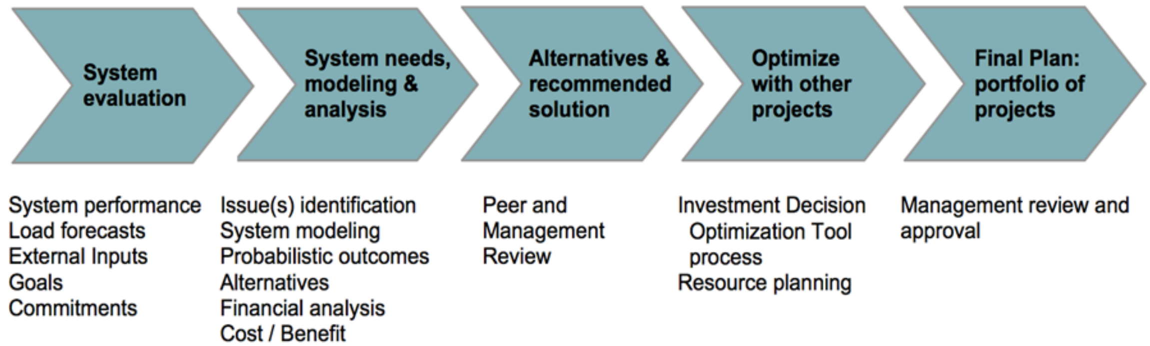
A. For programmatic work, a program manager is assigned to a collection of projects. They oversee delivery of program objectives over the many specific individual projects, applying the same project management principles described above. To maximize benefits for customers and to adapt to changes, programs are managed around core objectives, allowing for tradeoffs of projects within a core objective and across years. Bamba, Exh. RBB-1T, discusses this implementation strategy and how changes are made based on maximizing benefits across core objectives.

Q. Please summarize PSE's delivery system planning process at a high level.

A. Delivery system planning is the engineering function that evaluates PSE's operating needs under various future conditions and identifies solutions to predicted deficiencies.

PSE's delivery system planning process can be simplified into five planning steps as shown in Figure 1 below. The delivery system planning process is complex and includes rigorous input, processes, and controls so that PSE delivers optimized benefits for customers.

Figure 1. PSE's Delivery System Planning Process



The planning process begins with an evaluation of the system's current performance and future needs through data analysis and modeling tools, utilizing established planning guidelines for consistent analysis at various steps of the process. Planning considerations include internal inputs such as reliability indices, Company goals and commitments, and reviewing the root causes of historic outages. In addition, external inputs such as service quality indices, regulations, municipal infrastructure plans, customer complaints, and ongoing service issues are considered.

Next, system needs are identified through modeling where predictions and solution alternatives are developed. Those alternatives are vetted and reviewed. Projects are compared against one another and against a portfolio of projects based on optimizing benefit and cost for a given funding level using PSE's investment decision optimization tool ("iDOT"). The process is the same for both long-term and short-term planning. PSE may run various scenarios of financial constraints to evaluate how the investment portfolio changes. PSE's planning process and optimization has moved from defining the following year's work to defining work to be completed two to three years out, at a minimum, to increase the likelihood of successfully completing the work per the investment plan. Finally, PSE considers additional factors such as resources or work in progress risk and a final set of programs and projects are sent to the Operations PMO.

PSE has continuously improved its delivery system planning processes recognizing the proliferation of DERs on the distribution grid will change how the system operates and subsequent needs that will be identified. Additionally, as technology costs decrease, application of non-traditional alternatives have become part of the planning process which requires broader internal engagement in the planning process. While the core planning process remains the same, PSE's processes now stretch across many departments and embody capabilities that PSE is maturing to meet the changing planning paradigm.

Q. How does this process intersect the corporate business planning process?

A. When it is time to update PSE's five-year investment plan, Operations prepares Operational Corporate Spending Authorizations ("CSA") to document the funding request. The type of investment will drive what the funding request is based on (i.e., projected, programmatic, or specific). For discretionary planned work, the first two-to-three years of the Operational CSAs are informed by the Operations PMO from work that is already in implementation. The outer years of the funding request are more heavily informed by PSE's Operations Business Plans and longer range plans such as the transmission planning studies required by the NERC Reliability Standards. The result of this process means that funding requests earlier in the five-year investment plan are more accurate than in later years because projects are better defined. Funding requests later in the five-year investment plan are generally based on programmatic trends and historical average costs. Kensok, Exh. JAK-1T, discusses the corporate business planning process and allocation process from this point forward.

Q. Please describe PSE's delivery system planning five step process in more detail.

A. The following discussion reviews each step in the process, what it means and what is accomplished through each step.

1. System Evaluation

Q. What does the "system evaluation" step of planning entail?

A. System evaluation entails reviewing and analyzing operating performance, understanding the load forecast, and gathering inputs to consider including corporate goals and commitments.

Q. When does the system evaluation step begin?

A. Delivery system planning is done at least annually in order to provide input to the corporate business planning process. Evaluating whether a change is needed in the system is triggered by any one of the following:

- Demand and energy load changes, changing load patterns, increasing overall growth, peak demand growth, specific location load additions, transportation growth;

- Reliability and integrity concerns such as asset health and aging infrastructure, changing expectations or requirements around system performance;
- Integration with energy supply resources;
- New regulations such as CETA or the Protecting Our Infrastructure of Pipelines and Enhancing Safety Act ("PIPES Act"); or
- Company objectives and strategy changes.

2. System Needs, Modeling and Analysis

Q. What does the "system needs, modeling and analysis" step of planning entail?

A. System needs, modeling, and analysis uses the data gathered in system evaluation, along with documented planning guidelines, to predict current or future issues. It leverages modeling software and probabilistic tools and develops alternatives to solve these identified issues, including their benefits and cost.

Q. Is there operating criteria PSE must consider?

A. Yes. PSE must provide uninterrupted service under peak conditions while meeting minimum criteria driven by regulations, tariffs, and the local climate, including:

- Safety and operational regulations such as prescribed minimum and maximum voltages or pipeline operating pressures;
- Tariffs and contracts, which drive the firm or interruptible service levels during peak or emergency events;
- Weather trends relative to seasonal peaks;

- Manufacturer design and thermal limits of equipment ratings for normal operation and short-term emergencies; and
- Interconnectivity with other utilities and resources and resulting requirements.

PSE reviews adherence to these criteria over various time horizons. For example, transmission, substation, or high-pressure mains are evaluated over a time horizon of ten years because of the timeframes needed to implement solutions or regulatory requirements. Smaller distribution mains or feeders are evaluated over a time horizon of only three to five years. Issues or "needs" must be resolved when criteria cannot be met over these time horizons.

Q. Does PSE use common modeling and analysis tools?

A. Yes. PSE planners use tools that are common in the industry to model performance and evaluate system risk. For example, transmission planners use Power World Simulator – Power Flow, an industry software tool for sharing infrastructure and load models and assumptions across regional systems such as the Western Electricity Coordinating Council. Distribution planners use Synergi, an industry software tool that is used to model the electric system and the gas system and reliability needs. Other models such as PSE's risk analysis models used in PSE's Distribution Integrity Management Program or reliability models were developed for PSE's specific use, but follow general practices.

Q. What are the inputs into the models?

A. PSE's models have different inputs. Primary inputs for PSE's Power World and Synergi models are demand and load forecasts from the IRP econometric load analysis, allocated in the model by county and local area. Infrastructure configuration is also a primary input. Primary inputs for PSE's risk models are field and maintenance reports along with system and equipment data and reliability analysis inputs are outage data, equipment age, and operational risks.

Additional inputs to the process include regulations, municipal, and utility improvement plans, and customer and stakeholder feedback, including information gathered through surveys, workshops, and discussions such as in the IRP public participation process, as well as Company objectives such as PSE's grid modernization strategy.

Q. How is a "need" documented?

A. PSE documents a need from system evaluation, modeling, and analysis along with the preferred alternative in iDOT as the optimization process begins. I discuss iDOT and the optimization process below. Some needs benefit from further validation and review before they are ready to be evaluated in iDOT. These projects are generally larger and more complex, and PSE documents the development of the need in a document called a "Needs Assessment" that is then handed off to the Operations PMO for further review by internal stakeholders. For programmatic work, a business plan is developed to document the need of an asset type, class, or population, or to document the need of a performance objective.

Q. Are "needs" reviewed by management?

A. Yes. Needs are reviewed with PSE management, specifically when solutions might be major and needs assessments documents are signed. Business plans are reviewed by management and incorporated into Operational CSAs as management reviews funding requests through the corporate business planning process.

3. Alternatives and Recommended Solutions

Q. What does the "alternatives and recommended solutions" step of planning entail?

A. Alternatives and recommended solutions are developed for addressing needs.

Q. Is there more than one alternative that can solve a need?

A. It depends on the need. There may be different types of alternatives that can be deployed. For example, capacity needs can be addressed through alternatives that add a new energy source, reduce load through demand side management programs, or upgrade the rating of an existing line. Reliability or integrity needs can be addressed through alternatives that replace deteriorating material and equipment, add protection from third party damage, change operating practices, strengthen infrastructure to withstand external forces, or utilize new technologies.

However, for needs such as addressing aging infrastructure, such as a deteriorating pole, replacing the pole with a like kind pole is the only cost effective type of solution alternative to consider. PSE often considers the alternative to "do nothing" which is the alternative to wait until the need occurs and then address the unplanned emergency event. This type of alternative generally costs more than alternatives that address a need in a planned way prior to occurring.

Q. Does PSE pursue non-traditional alternatives to meet these needs?

A. Yes. As discussed above, PSE has improved its process to evaluate non-traditional solutions where technologies such as batteries or demand side programs have become cost competitive in solving unique needs. PSE's first non-wire alternative analysis was in 2015 as the Energize Eastside project was being studied. Dan'l R. Koch discusses this alternative analysis in Exh. DRK-1T. PSE also piloted four non-wire alternative studies assessing different need drivers beginning in 2017. One of these pilot studies addressed a capacity constraint, degrading integrity of aging infrastructure, and poor reliability on Bainbridge Island. In that case, PSE implemented a hybrid solution that is a combination of several alternatives including a battery, a demand response program, and a new transmission line.

However, non-wire alternative analysis often adds more complexity to the planning process and takes significant time and effort. PSE has found that with some needs, the non-wire alternative is not the preferred solution for several reasons.[1] On February 10, 2021, PSE presented and sought feedback at IRP Webinar #12 regarding non-wire alternative key findings and a proposed screening process for when to consider a non-wire alternative analysis.[2] Some of PSE's findings from performing non-wire alternatives with industry experts found that non-wire alternatives often do not address 1) large capacity needs due to large storage sizing; 2) reliability needs that are long duration event or where there is limited flexibility; and 3) aging infrastructure because of long discharge duration. Additionally, PSE continues to refine the proposed screening process that would initiate a non-wire alternative analysis if three factors were met: 1) a need date out more than three years; 2) a capacity need greater than 1MW and less than 20MW; and 3) a wired solution greater than $5 million.

Q. How are alternatives evaluated?

A. Alternatives are evaluated against technical and non-technical solution requirements. Technical criteria are specific operating parameters that must be met, such as serving the normal winter peak load forecast for ten years or operating below substation load triggers for ten years. Non-technical criteria include parameters such as when the project must be completed by, feasibility of

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[1] *See* EPRI, *Screening of Non-Wires Alternatives in distribution Planning Guidance, Criteria, and Current Practices* (Dec. 2020) (technical update).

[2] Puget Sound Energy, *2021 IRP Webinar #12: Delivery System and Grid Modernization Solutions, Flexibility Analysis results, Portfolio draft results, and Economic, Health and Environmental Benefits Assessment of Current Conditions Status Update* (Feb. 10, 2020), https://oohpseirp.blob.core.windows.net/media/Default/2021/meetings/Feb_10_Webinar/webinar12_FINAL.pdf.

permitting, or maturity level of technology. Alternatives that do not fully meet the defined criteria for a given need will not be evaluated further.

Q. Please describe how the cost of alternatives are estimated.

A. Planning level alternative costs are estimated using historical averages tracked by PSE's Operations PMO. Cost estimates may be refined as more specific detail is known such as permitting requirements or constructability considerations.

Q. How does PSE decide the preferred alternative to recommend?

A. Assuming there is more than one viable alternative and one does not clearly rise to the top due to cost, PSE may use iDOT to evaluate the benefits of a given alternative. I discuss iDOT in more detail below when I explain how PSE optimizes the preferred Operations' discretionary portfolio of projects and programs for consideration in the corporate business planning process. While the primary use of iDOT is to perform portfolio optimization, the benefit to cost methodology can be used to evaluate different alternatives before progressing further in the planning process. The iDOT tool provides a consistent methodology for calculating benefits an alternative will provide versus a do nothing alternative. The alternative that has the greatest benefit to cost ratio is determined to be the preferred alternative.

Q. How is a "preferred alternative" documented?

A. PSE documents the preferred alternative along with the need in iDOT and the benefit is calculated, if it was not previously. For projects that are further evaluated by internal stakeholders through the Operations PMO as an extension of the Needs Assessment review, the development of the preferred alternative is documented in a document called the "Solution Assessment."

Q. Are alternatives reviewed by management?

A. Yes. Proposed projects are reviewed with PSE management.

4. Optimize with Other Projects

Q. What does the "optimize with other projects" step of planning entail?

A. Optimize with other projects is the evaluation of the best set of Operations' discretionary projects that moves forward to the corporate business planning process.

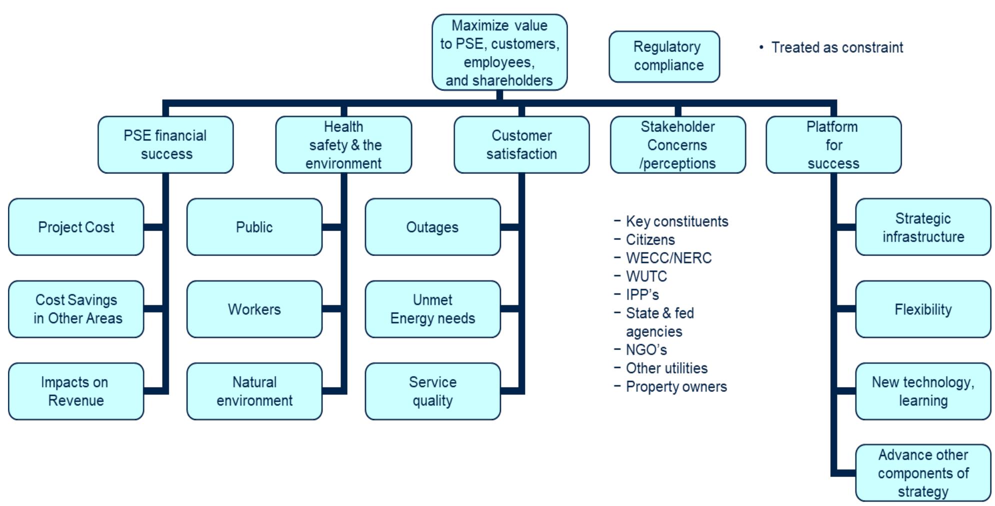
Q. Please describe the iDOT portfolio optimization tool in more detail.

A. iDOT is a project portfolio optimization and multi-variable attribute value-based decision analysis tool. iDOT allows PSE to compare the relative costs and benefits of various solutions (i.e., projects) and makes it easier to conduct side-by-side comparisons of projects and programs of different types, thus helping PSE evaluate infrastructure solutions that will be in service for thirty to fifty years.

iDOT optimizes benefits and costs for a given financial portfolio, defining the best set of feasible projects against a set of constraints and dependencies.

Q. Please describe the benefits that are input into iDOT.

A. The benefit value of a project or program is measured by up to 13 benefits divided between five categories. A planner calculates the benefits and then inputs the benefit data of the preferred alternative and the do nothing alternative into iDOT. The benefit value of the project is determined by comparing the preferred alternative benefit to the do nothing alternative. All inputs are checked for quality and consistency with procedures. Figure 2 is the iDOT benefit hierarchy for both electric and gas projects.



Q. Are all benefits equivalent?

A. No. Benefits are weighted differently. The weighting is established by PSE leadership and is reviewed periodically. PSE is currently evaluating its benefits weighting to integrate values such as equity, named populations, and carbon impacts.

Q. How does iDOT calculate the total benefit value using the benefit hierarchy?

A. For each project, iDOT calculates the annual benefit value by comparing the benefits of the preferred solution and doing nothing. While some benefits are quantified in financial terms, some benefits are qualitative or are not financially quantified. To compare total benefits to total financial costs, all benefits, including qualitative and non-financially quantified iDOT benefits, must be financially represented. Benefits are translated to financial values by determining the ratio of each benefit weight to the financial benefit and then multiplying by $1 million to get relative value in financial terms. The total project benefit is the summation of the project benefits calculated in net present value terms. The final project benefit value is adjusted by project cost, schedule, or benefit realization risk. The iDOT optimization logic maximizes the risk-adjusted net present value of the benefits to net present value of the project costs within applied financial constraints. The total net present value benefit divided by the net present value of the project costs is the benefit to cost ratio or "B/C ratio." The B/C ratio measures the relative value of the project

Q. Is optimization the same as prioritization of the projects?

A. No. As constraints are changed, an optimal set of projects can change. Prioritization determines a project set order by moving the cutoff line up and down on a list of projects that are ranked by project B/C ratio. Optimization is fitting as many larger B/C and smaller B/C projects into a portfolio as possible such that the total B/C of the portfolio is the greatest. When the constraints change, the set of projects that produce the total best B/C will be different.

Q. Does PSE optimize the next year's portfolio of work?

A. Historically, PSE would plan and then optimize near the end of the year, producing a set of projects to be implemented the following year. However, as project timelines lengthen, many projects would not be completed in the year the investment was budgeted, creating significant carryover of work into the following year. With the planning process improvement work described earlier in my testimony, PSE now is planning and optimizing a portfolio that is two to three years out. For example, PSE's optimization process in 2021 produced the 2023 portfolio of work. While project timelines may still need to be adjusted, this forward planning approach increases the likelihood of meeting the expected investment plan for a given year.

5. Final Plan: Portfolio of Projects

Q. What does the "final Plan: portfolio of projects" step of planning entail?

A. iDOT optimization results are reviewed by the team and management and the best portfolio is identified after considering any other factors such as resource constraints, construction considerations, and regulatory considerations. The final list of optimized projects is then sent to the Operations PMO. Included is the work management notification, project name, preferred scope, anticipated cost, and benefits along with any other relevant documentation such as Needs Assessments, Solutions Assessments, or Business Plans.

Q. How does the optimized Operations portfolio integrate with the corporate business planning process?

A. PSE's five-year investment plan sets the financial parameters within which Operations spending occurs. As discussed above, once the optimized project portfolio is handed off to the Operations PMO, project planning begins in accordance with the five-year investment plan, which informs the Operational CSAs that are submitted in the next year's business planning process. The budget allocation process discussed by Kensok, Exh. JAK-1T, considers many corporate factors and leverages the benefit and other information from the plans to evaluate different investment scenarios. The annual cycle repeats, increasing focus on a given year's plan as it becomes more near term, is better defined, and informed through the corporate business planning process.

Q. Should the Commission have confidence in PSE's Operations plans because of PSE's planning process?

A. Yes. The Commission should have confidence in the robust planning process that PSE employs. It is data driven, values benefits that are customer focused, allows apples to apples decisions that optimizes a portfolio of many different types of projects, and removes subjective influence in the decision process. PSE also continues to improve the process to adapt to current industry thinking, the regulatory environment, new technologies, and other factors.

6. Back-Casting and Benefits Realization

Q. Please briefly describe PSE's back-casting and benefit realization process.

A. Back-casting and benefits realization is not listed on Figure 1 but is a critical part of the planning process. Following implementation of a project, PSE performs improvement verification analysis to determine whether the project provided the projected benefit. To collect a sufficient amount of data for an analysis, investments are typically reviewed three or more years after implementation with a focus on programs that are ongoing. For each project, where data is available, actual performance is compared to projected performance from the project scope. The improvement verification analysis information can be used to adjust predicted benefits for future projects and can help to identify where there might be issues with benefit assumptions, project implementations, system operation, or data accuracy. PSE's PMO tracks benefits as investments are executed to inform decisions and make execution or investment adjustments as needed. This backward-looking review informs PSE's ongoing planning process.

D. Unplanned Investments

Q. Please describe how PSE manages execution of a unplanned projects to provide the best outcome for customers.

A. Unplanned investments follow established procedures for repairs and completion as defined in gas design, construction, and operating field procedures and standards and electric design and construction work practices. These standards, procedures, and work practices are reviewed on a routine basis, and are revised to address execution issues as needed. Emergency events also follow robust emergency management processes through the implementation of best practice incident command structures. PSE's Emergency Coordination Center coordinates and sets priorities for emergency repairs to provide the best outcome for customers. Unplanned projects are directly observed by quality control experts or a sample of the work is inspected for quality post-completion based on risk. Metrics associated with these investments are tracked and reviewed monthly by Operations leadership to inform possible mitigation management actions that could be taken such as additional tree trimming or inspections. PSE is audited annually by the Commission regarding adherence to PSE's gas standards and procedures, reviewing records and performing field observations, and PSE's successful pass of those audits demonstrate effective management of planned and unplanned work. In emergencies, the Commission may also monitor PSE's project execution. PSE's NERC Reliability Standards audits provide similar assurance for electric transmission investments. Finally, select gas and electric emergencies are reviewed to understand root causes of the events. Where adjustments to work practices are needed, standards and procedures or investment plans are revised.

III. TRANSMISSION AND DISTRIBUTION WORK OVERVIEW

Q. Please describe the reasons or drivers for PSE's gas and electric transmission and distribution work.

A. As described in Koch, Exh. DRK-1T, PSE's transmission and distribution work objectives include: 1) maintaining customer and public safety; 2) meeting electric and gas growth and service needs; 3) modernizing the grid to support reliable and resilient clean energy; 4) modernizing the pipeline system to support safe and reliable lower carbon pipeline energy; and 5) pursuing operational excellence and continuous improvements to meet customer expectations. I address each of these below.

A. Investments Made to Maintain Customer and Public Safety

Q. Please describe PSE's investments made towards customer and public safety.

A. Customer and public safety is the highest priority in the daily operations of PSE's gas and electric systems. It is the primary driver of key activities such as emergency repair and active engagement with jurisdictions regarding public improvement projects that may impact PSE's infrastructure. My second exhibit, Exh. CAK-3, discusses these investments in more detail.

Q. Please describe the investments associated with emergency repair.

A. The primary focus of PSE's operational emergency response procedures is the safety of our customers and the general public. Emergency repairs, "corrective maintenance," or emergent investments on the electric system includes the repair and/or replacement of failed or compromised infrastructure, such as replacing a pole that has been damaged and imminent failure could occur. Similarly, gas system corrective maintenance includes repair and/or replacement of failed or damaged infrastructure, such as a meter set that has been damaged or a leak that requires extensive pipe replacement.

Investments in tools and actively reviewing new technology is important as well. PSE is active in evaluating the tools it uses to work safely but also to leverage new technologies for more efficient work. One example is PSE reviewed laser detection tools that enable leak survey in hard-to-reach locations such as steep slopes, rooftops, up building walls, stream crossings, and over fences where personnel cannot access.

Q. Please describe how PSE decides what emergency repair investments are needed.

A. Emergency repair investments are non-discretionary and unplanned in direct response to notifications of a problem or outage through a variety of internal and external communication channels. They require immediate attention. Upon notification of such an event, qualified electrical or gas personnel are dispatched as quickly as possible so the scene is safe for the public and to determine what repair work is needed, and may attempt to repair the issue, if possible. If they determine the need for a more complex follow-up repair, larger crew resources from PSE's service providers are dispatched.

Q. Please describe the investments associated with public improvement projects.

A. Public improvement investments are in response to requests by municipalities to relocate facilities as specified in a jurisdictional franchise agreement so PSE's infrastructure is safe from construction and future operational damage. These franchises allow PSE the ability to locate facilities in the public right of way, but when road or transportation projects change the right of way, PSE often must relocate those facilities, generally at PSE's cost. This work includes large transportation projects or initiatives that require substantial multi-year plans such as the Washington State Department of Transportation ("WSDOT") Clear Zone program that requires the relocation of poles from the edge of a WSDOT right-of-way to a specified safer distance away from traffic or Sound Transit rail and station relocations, as light rail expands across the region.

Q. Please describe how PSE executes on public improvement investments.

A. PSE operates and has infrastructure in the public right of way of over 135 jurisdictions and thus must adhere to many different timelines, requirements, and approaches to jurisdictional transportation improvement projects. This non-discretionary work takes priority over planned work and frequently has short timelines or insufficient notice. When public improvement projects are initiated, a PSE project manager meets with the jurisdiction to determine the scope and requirements of the work and plans the required relocation work. The project manager also negotiates road and transportation design changes to minimize relocation work, reduce costs, and provide ongoing infrastructure safety. In most cases, existing infrastructure is relocated by replacing with like-kind equipment and materials, preserving the existing functionality of the system. However, sometimes there are opportunities to install PSE infrastructure that has been identified in other PSE work plans in conjunction with the facility relocation, saving future costs related to paving and transportation disruption.

B. Investments Made to Meet Customer Growth and Service Needs

Q. Please describe PSE's investments made towards gas and electric customer growth and service needs.

A. The primary driver of PSE's investments to meet customer growth and service needs include responding to customer requests for service and ensuring the backbone gas and electric system has the capacity to meet growing load because of customer additions over time. PSE's established tariffs define costs and contributions required for customer requested work. My third exhibit, Exh. CAK-4, discusses these investments in more detail.

Q. Please describe the investments associated with customer requested work.

A. Per WAC 480-100-148[3] PSE has an obligation to make electric service available, but gas service is primarily driven by a customer's desire for gas. Customer construction work makes up about 25 percent, annually, of the Operations capital requests. Customer construction investments may require reimbursement from the customer per Company tariffs. Over the last five years, on average about ~~20~~41 percent of PSE's electric customer construction and ~~four~~nine percent of PSE's gas customer construction has been historically reimbursed.

Q. Please describe how PSE decides what customer-requested investments are needed.

A. When PSE receives a non-discretionary customer request for new service, PSE works with the customer to scope the work, per standard designs and according to established tariffs, in a way that is most cost effective for their need.

Q. Please describe the investments associated with capacity work.

A. The collective increase in customer additions can strain the gas and electric infrastructure and require additional investment. This is referred to as "capacity work," which addresses the need to build larger or more pipes or wires to carry the volume and current within required performance standards (i.e., maintain voltage levels or gas pressure) for customer appliances to function properly. If

[3] WAC 480-100-148 details the Service Responsibilities of the Electric Utility and Customer.

capacity concerns are left unaddressed, utility or customer equipment could overload and fail due to voltage or low pressure. Broadly, a system that is capacity deficient means during peak times an outage may result, which is costly to customers and the utility to restore service. It could also result in PSE not being able to approve new load to be added to the system.

Q. Please describe how PSE decides what capacity investments are needed.

A. Capacity investments are discretionary and as such follow the rigorous planning process described above. Because these are a result of load growth across many customers and over time, the cost for this infrastructure work is borne by all customers. Need is identified and developed using corporate customer and load forecasts that are based on econometric data science from PSE's IRP.

C. Investments Made to Modernize the Grid, Bringing Clean Energy That Is Reliable, Resilient, Smart and Flexible

Q. Please describe the investments made towards grid modernization.

A. PSE is transforming the grid to reliably enable greater demand side management and DERs to meet CETA requirements and enable customer choice such as electric vehicles. As described in PSE's 2021 Clean Energy Action Plan ("CEAP"),[4] the delivery of resources requires a reliable, resilient, smart, and flexible grid with key capabilities in the areas of grid visibility, analysis, and

[4] Puget Sound Energy, *Clean Energy Action Plan*, *in* 2021 PSE INTEGRATED RESOURCE PLAN 2-1, 2-20 (2021), https://oohpseirp.blob.core.windows.net/media/Default/Reports/2021/Final/02.%20IRP21_Ch2_032921.pdf.

control; grid reliability and resiliency; cyber security and privacy; integrating DERs; and addressing backbone infrastructure needs. As discussed in Exh. DRK-1T, PSE has been preparing for cleaner energy for over a decade, modernizing the grid with these key capabilities in mind.

Q. Please describe how PSE decides what grid modernization investments are needed.

A. These discretionary investments are planned following the planning process described above. PSE's grid modernization strategy provides a framework and roadmap for a holistic programmatic approach to advance and sustain PSE's grid. This holistic approach avoids reactive expenditures from unanticipated growth in DERs[5] and increasing loads, supports customer programs, and supports safe and reliable operations. There are three overarching programs of grid modernization that advance and sustain the grid:

1. **Grid Modernization-CEIP:** Which has the objective of directly supporting the filed CEIP plan. There are 12 plans associated with this objective, specifically tools, infrastructure improvements accelerated or new to support DERs, and distribution efficiency.

2. **Grid Modernization-Core:** Which has the objective to address concerns with asset maintenance and replacement and improves circuit performance. There are approximately 18 programmatic plans associated with this objective that represent some areas PSE has been focused on for many years and some that are new like the Wildfire Mitigation plan.

3. **Major Projects Electric and Specific Backbone Infrastructure:** Which are investments designed to enhance the robustness of the transmission

[5] The goal of a DER plan as described in RCW 19.280.100(2)(e) is to avoid reactive expenditures to accommodate unanticipated growth in distributed energy resources.

and substation system. There are nine specific electric projects underway and 18 more in the initiation phase.

My fourth exhibit, Exhibit CAK-5, discusses these three programs and the plans associated with them. Bamba, Exh. RBB-1T, discusses the execution strategy of these programs and plans and specific projects that are greater than $10 million.

Q. What regulatory basis is there for expecting grid modernization to be associated with clean energy transformation?

A. While the terminology of clean energy transformation may be recent, precursor regulations to CETA defined the expectations that utilities build and report on grid capabilities that clearly advance and enable CETA. In 2010, the first Smart Grid Technology Report, required per WAC 480-100-505, discussed PSE's efforts to build a smart grid, called "grid modernization" today, as defined in the regulation. Efforts include expanding digital information capabilities, sensing disruptions, managing end use load, measuring customer owned generation, and voltage control, to name a few. These capabilities are found in CETA language today, including terms such as DERs, demand response, and load management programs.

Distribution investments such as DERs are only possible with a modern two-way flow grid and CETA expressly directs utilities to consider DERs in their distribution planning. RCW 19.280.100(2)(e) directs utilities to plan distribution investments with the goal of providing the most affordable investments for all customers and to avoid reactive expenditures to accommodate unanticipated growth in DERs. Investments that prepare for DER growth are grid modernization investments in capabilities such as control through SCADA and automation through distribution automation. Additionally, in the development of a CEAP, RCW 19.280.030(2)(e) expects that a CEAP will identify any need to develop new, or expand or upgrade, existing bulk transmission and distribution facilities.

Finally, CETA, through RCW 19.405.060 (1)(c)(iii), requires that clean energy benefits include energy security and resiliency. Stakeholders value less and shorter outages, which is furthered by grid modernization investments such as targeted circuit reliability programs, addressing aging infrastructure, and adding automation so that when a DER operates on a circuit in a storm, for example, the lights stay on for all customers on the circuit.

PSE's grid modernization investments are required for PSE to be able to comply with CETA and to achieve PSE's clean energy plans as described in its CEIP and CEAP.

Q. Does PSE's grid modernization work address the threat of wildfire?

A. Yes. PSE recognizes that wildfire risk is an increasing threat, one that communities and the Commission is concerned about. PSE has developed a strategic plan, the PSE Wildfire Mitigation and Response Plan, which was submitted to the Commission in July 2021. PSE's Wildfire Mitigation Business Plan in support of PSE's Wildfire Mitigation and Response Plan is discussed further in my fourth exhibit, Exh. CAK-5. PSE's Wildfire Mitigation Business

Plan discusses the collective focus on wildfire threatened areas across all of PSE's Operations' business plans, together investing approximately $129.5 million in wildfire mitigation through the rate plan.

Q. Does PSE's grid modernization work address tree caused outages?

A. Yes. PSE's programs such as Targeted Reliability and Worst Performing Circuit address tree caused outages specifically. Additionally, PSE's ongoing tree maintenance practice as well as hazard tree removal program is an important element of maintaining and improving reliability. In my fourth exhibit, Exh. CAK-5, I discuss PSE's historical Tree Watch program and the benefit gained through programmatically removing off right of way hazard trees. Although a refreshed, more expansive tree program is not ready for full funding consideration as of now, PSE will further define it and seek potential grant opportunities associated with the recently passed Infrastructure Investment and Jobs Act. If successful, PSE would consider modifying the submitted plan and pursue a similar amortization approach to this capital deferring O&M expense.

D. Investments Made to Modernize the Pipeline System

Q. Please describe the investments made towards pipeline modernization.

A. Pipeline modernization investments, while not driven by CETA, provide similar capabilities of advancing technologies to enhance and increase functionality and drive transformative pipeline and operational change to reduce all possible methane emissions. These capabilities will help to meet anticipated rules in 2022 of the Climate Commitment Act and position PSE's operation and pipeline system to adapt to new innovative technologies that are driven by the intended investments that will result from the Cap and Invest Program of this Act. An ideal modern pipeline system does not leak, deploys automation to respond to leakage events, carries fuels that have low carbon impact, and provides a diverse energy choice to customers which prevents overbuilding of electric infrastructure and resilience when the power is out.

Q. Please describe how PSE decides what pipeline modernization investments are needed.

A. These discretionary investments are planned following the planning process described above. The pipeline integrity management program as well as pipeline modernization initiatives provide the framework for a programmatic approach to address asset risk and methane emissions release. Recent regulations from the PIPES Act will make some of these methane reduction actions required and less discretionary over time. There are three overarching programs of pipeline modernization:

1. **<u>Pipeline Replacement:</u>** Which has the objective to deliver PSE's master pipeline replacement plans. There are four programmatic plans associated with this objective, specifically related to what is included in PSE's Pipeline Replacement Plan approved by the Commission in August 2021. Free, Exh. SEF-1T, discusses this cost recovery mechanism in the multiyear rate plan.

2. **<u>Pipeline Modernization:</u>** Which has the objective to address asset risks and reduce methane emissions. There are six programmatic plans associated with this objective that represent areas PSE has been focused

on for many years and some new like the Enhanced Methane Emissions Reduction plan.

3. **Major Projects Gas and Specific Backbone Infrastructure:** These projects provide strong intermediate and high-pressure systems. There are seven projects in the initiation phase.

My fifth exhibit, Exhibit CAK-6, discusses these three programs and the plans associated with them. Bamba, Exh. RBB-1T, discusses the execution strategy of these programs and the plans and specific projects that are greater than $10 million.

E. Investments Made Towards Operational Excellence and Continuous Improvement

Q. Please describe the investments made to improve or maintain operations, performance, and service.

A. Several large initiatives improve operational excellence, including the deployment of AMI, which is a key foundational technology that will advance grid and pipeline modernization and many customer programs discussed by other witnesses. I discuss AMI in detail in my sixth exhibit, Exh. CAK-7, and make note of its benefit to grid modernization in my fourth exhibit, Exh. CAK-5, and to pipeline modernization in my fifth exhibit, Exh. CAK-6. Another initiative is PSE's implementation of the Integrated Work Management system that improves field force management in meeting the schedules of customer requests. This is discussed further in Tamayo, Exh. SLT-1T.

Finally, one last large initiative will be the new Operations Training Center to be built in 2023 that will enable new training approaches for workforce skill growth, advancing competence in the grid of the future and a decarbonized pipeline system, and enlarging opportunities to partner in training first responders for utility emergencies. I discuss PSE's Operations Training Center below and it is also discussed in Reyes, Exh. DMR-1T.

IV. TRANSMISSION AND DISTRIBUTION INVESTMENT SINCE THE LAST GENERAL RATE CASE

Q. Please provide an overview of the gas and electric transmission and distribution work performed since the end of the last rate case through the end of the test year, June 30, 2021.

A. Between January 1, 2019 and June 30, 2021, PSE invested in over 39,000 projects at a cost of $783 million in electric transmission and distribution infrastructure. Additionally, PSE invested in 44,000 gas distribution projects at a total cost of $665 million. Further, PSE invested $14.6 million in infrastructure that is shared between electric and gas transmission and distribution, the majority of which is AMI. Figures 3 and 4 below detail the electric and gas capital expenditures by Operations' objective.

Figure 3. Electric Capital Expenditures from January 1, 2019 through June 30, 2021 by Category

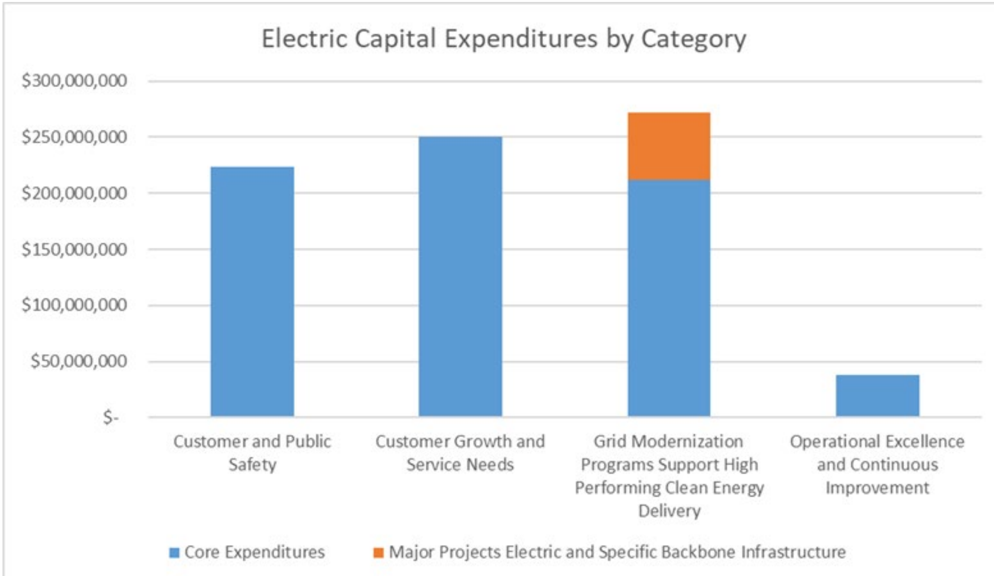
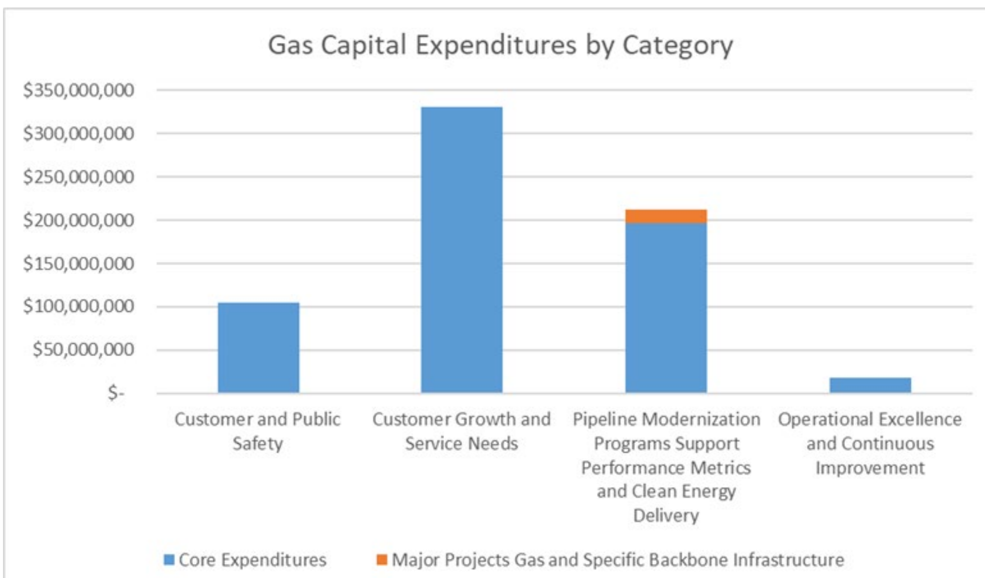


Figure 4. Gas Plant in Service from January 1, 2019 through June 30, 2021 by Category



PSE invested $17 million in operations and maintenance ("O&M") relating to the capital investment ("OMRC") associated with the $783 million for electric infrastructure, and $0.1 million in OMRC associated with the $665 million for gas infrastructure. I discuss O&M and OMRC in more detail in section VI below.

Q. What investments did PSE make to maintain customer and public safety?

A. Between January 1, 2019 and June 30, 2021, PSE repaired electric infrastructure in response to 38,000 outages investing over $156 million capital and $9 million OMRC in transmission and distribution infrastructure such as replacing broken poles or emergent concerns about substation equipment. PSE responded to 47,504 natural gas odor calls and repaired 2,792 hazardous class A leaks investing over $44 million capital in pipeline distribution infrastructure such as replacing leaking or damaged mains and services. PSE also completed 575 electric safety relocation projects investing over $66 million capital and 427 gas safety relocation projects investing $60 million capital.

Additionally, PSE experienced 17 IEEE qualifying storm events between January 1, 2019 and November 18, 2021. Details regarding the extent and type of event, system and customer impacts, and qualifying triggers, are described in my seventh exhibit, Exh. CAK-8.

Q. What investments did PSE make to meet customer growth and service needs?

A. Between January 1, 2019 and June 30, 2021, PSE invested in over $243 million capital and $2 million OMRC in infrastructure for electric service to ~~37,173~~ 38,557 customers and over $330 million capital and $0.01 million OMRC in infrastructure for natural gas service to ~~21,340~~22,385 customers. PSE also completed eight electric capacity projects, investing over $6 million capital and

$0.18 million OMRC upgrading 11 miles of circuit to meet the load growth and near term forecasted growth, increasing capacity by approximately 729,080 MWh. PSE's pipeline "capacity" investments are currently only addressing load that cannot be served today without manual real time field adjustments. These investments are addressing reliability concerns and included in my fifth exhibit, Exh. CAK-6, regarding pipeline modernization.

Q. What investments did PSE make to modernize the grid?

A. Between January 1, 2019 and June 30, 2021, PSE programmatically completed 842 projects investing over $271 million capital and $3.4 million OMRC in infrastructure to increase visibility, analysis, and control, improve reliability and resiliency, prepare for integrating DERs, and reinforce the transmission and substation backbone. PSE avoided approximately 32 million customer minutes interrupted by upgrading 269 miles of distribution line, added enhancements to 69 circuits and 43 substations, and addressed over 1,975 assets. PSE also placed in service the Lake Hills – Phantom Lake Transmission Line and Bellingham Substation. Both projects are discussed in Bamba, Exh. RBB-1T.

Q. What investments did PSE make to modernize the pipeline system?

A. Between January 1, 2019 and June 30, 2021, PSE programmatically completed over 5,000 projects investing over $221 million capital to increase visibility, analysis, and control, reducing gas emissions, improve pipeline safety and reliability, and reinforce the high-pressure pipeline backbone. PSE improved pipeline reliability by eliminating 28,238 failure risks, reduced methane emissions by 6,631 metric tons of CO2 equivalent in supporting the objectives of the Climate Commitment Act, and added or upgraded over 47 miles of pipeline. PSE also placed in service the gate station and high-pressure pipeline associated with the Tacoma LNG facility.

Q. What investments did PSE make towards operational excellence and continuous improvement?

A. Between January 1, 2019 and June 30, 2021, PSE invested over $70 million capital and over $0.003 million OMRC associated with 4,377 communication network devices, 527,966 electric meters, and 360,140 gas modules placed in service, progressing AMI service to 1,106,981 customers. Additionally, PSE's operations team benefited from the completed Integrated Work Management initiative with improved field work scheduling discussed in Tamayo, Exh. SLT-1T.

V. PROJECTED, PROGRAMMATIC AND SPECIFIC TRANSMISSION AND DISTRIBUTION INVESTMENT PLANNED BETWEEN JULY 1, 2021 TO THE END OF THE RATE PLAN

Q. Please provide an overview of the planned gas and electric transmission and distribution investment between July 1, 2021 to the end of the rate plan, December 31, 2025.

A. Between July 1, 2021 and December 31, 2025, PSE will invest $2,575 million in electric transmission and distribution infrastructure, $1,153 million in gas distribution infrastructure, and $12.9 million in infrastructure that is shared between electric and gas transmission and distribution. Figures 5 and 6 below detail the electric and gas capital expenditures by category.

Figure 5. Expected Electric Capital Expenditures from July 1, 2021 through December 31, 2025 by Category

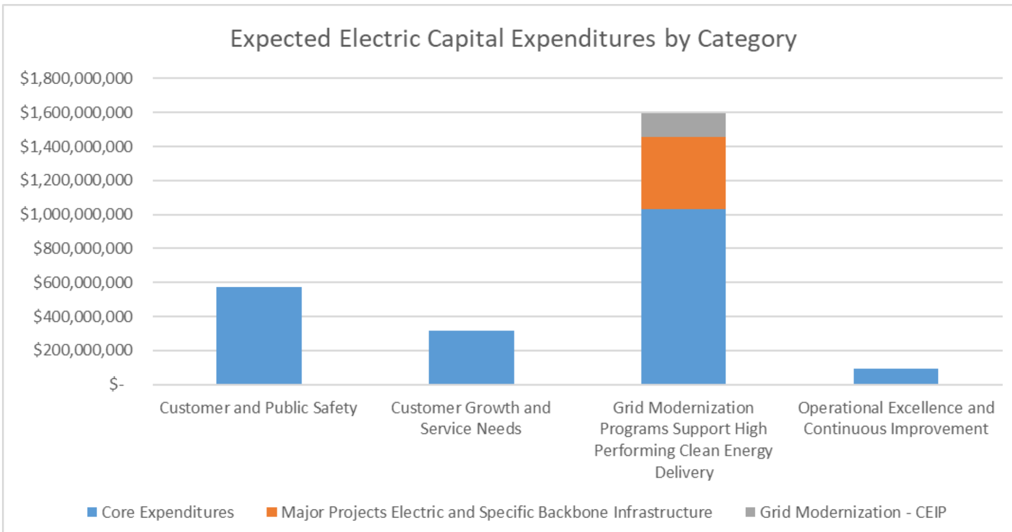
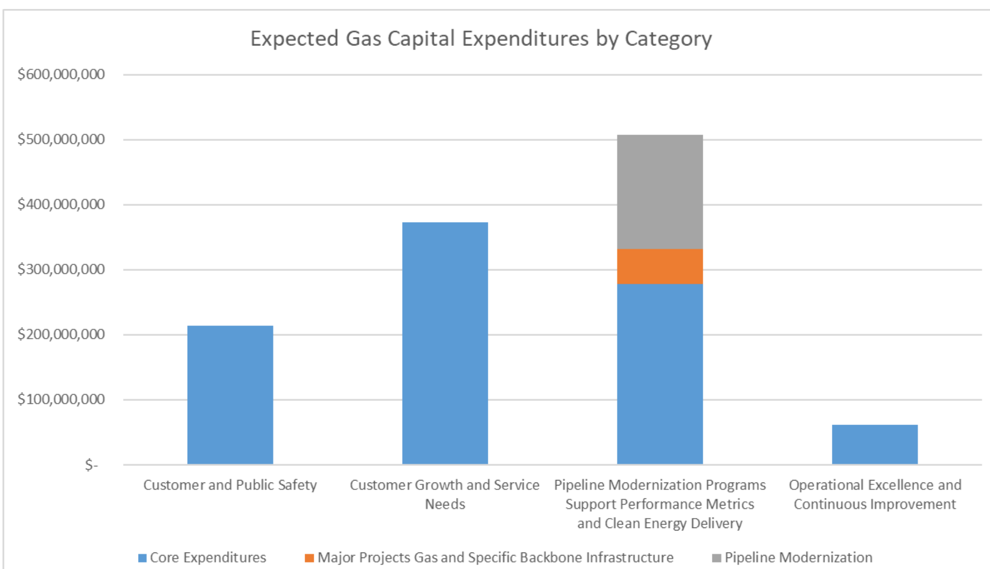


Figure 6. Expected Gas Capital Expenditures from July 1, 2021 through December 31, 2025 by Category



Q. Please describe how these investments align with the Commission's Policy Statement on Property that Becomes Used and Useful After the Rate Effective Date.[6]

A. Free, Exh. SEF-1T, describes the Commission's Policy Statement on Property that Becomes Used and Useful After the Rate Effective Date ("Used and Useful Policy") and how PSE is incorporating the policy. Investments are based on different drivers which are categorized in three ways as described in the Used and Useful Policy: Programmatic, Specific, and Projected. Table 2 provides a high-level summary of the Used and Useful category that each of the program types generally fall under.

Table 2. Used and Useful Categorization of Operations Program Types

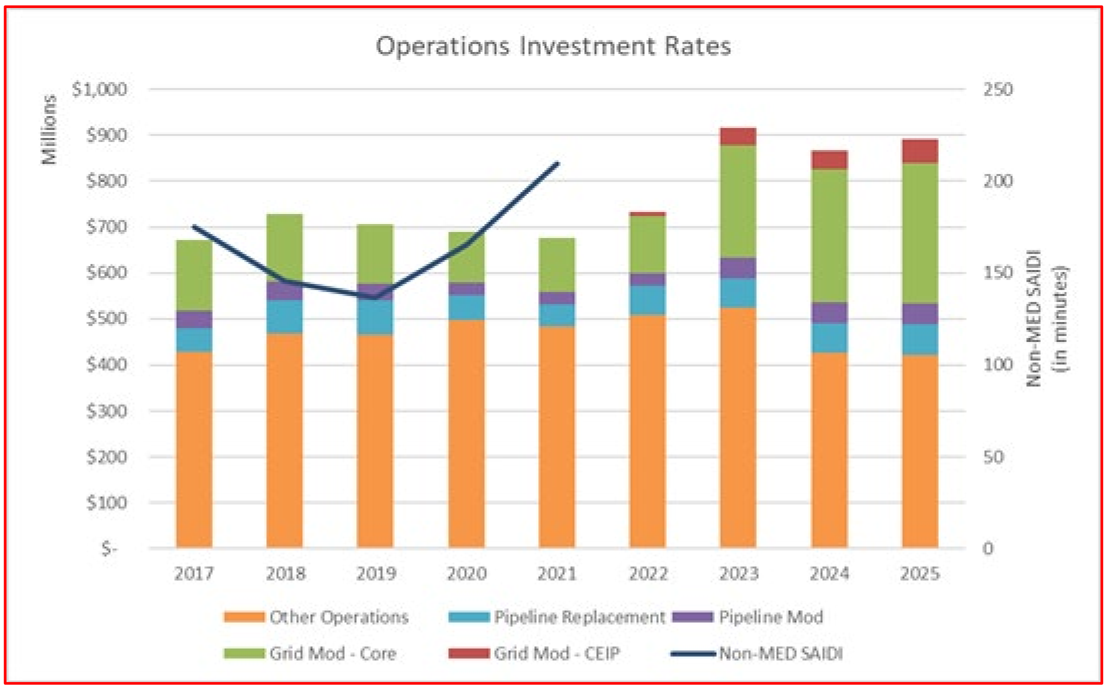
Objective	Program type	Used and Useful category
Customer and public safety	Emergency Repair	Programmatic
	Public improvement	Programmatic
Customer Growth and Service Needs	Customer requests	Programmatic
	Capacity	Programmatic
Grid Modernization	Grid Modernization - CEIP	Programmatic
	Grid Modernization - Core	Programmatic
	Major Projects Electric and Specific Backbone Instructure	Programmatic & Specific
Pipeline Modernization	Pipeline Replacement	Programmatic
	Pipeline Modernization	Programmatic
	Major Projects Gas and Specific Backbone Instructure	Programmatic & Specific
Operational Excellence	Advance Metering Infrastructure	Programmatic

[6] *In the Matter of the Commission Inquiry into the Valuation of Public Service Company Property that Becomes Used and Useful after Rate Effective Date*, Docket U-190531, Policy Statement on Property that Becomes Used and Useful After Rate Effective Date (Jan. 31, 2020).

Q. How does the Commission's approval of rate recovery for this multi-year rate plan enable PSE's ability to deliver safe, reliable, and clean energy to its customers?

A. To continue to meet core needs, make significant improvements in reliability and resiliency, and support the growing dependency on reliable and clean energy, PSE will need substantially greater funding in the outer years of the plan. Figure 7 shows the decreased investments in the previous five years relating to grid modernization and the increased need to slow the degradation of reliability.

Figure 7. Graphic of Operations investments rate from 2017-2025



The Commission's approval would allow PSE to accelerate and maintain committed resources to planning, designing, and constructing electric infrastructure and replacing and improving operation of pipeline facilities to reduce methane and support alternative fuels. Without such approval, PSE will reduce discretionary planned work, most likely in the grid modernization programs. This not only means reliability will decline, but PSE will not be able to support CEIP commitments and will impose more integration costs and time on DER bidders. Financial pressures continue through 2022 as provided in Exh. CAK-5 (grid modernization) and Exh. CAK-6 (pipeline modernization).

Q. Please describe the performance metrics discussed by PSE's witness Mr. Lowry that are related to Operations and the rate plan.

A. Lowry, Exh. MNL-1T, discusses several updates to PSE's current Service Quality Indices ("SQI") and the addition of several SQIs as it relates to AMI. Below I discuss the updates and the rationale for each. PSE is not proposing to change any measures or benchmarks for current SQIs relating to Operations:

SQI-2	Number of complaints to the UTC per 1,000 customers per year.
SQI-7	Time from customer call to arrival of field technicians in response to natural gas emergencies, average.
SQI-8	Percent of customers satisfied with field services based on survey.
SQI-10	Percent of service appointments kept.
SQI-11	Time from customer call to arrival of field technicians in response to electric system emergencies, average.

Below are the SQI measures PSE proposes to change:

Update to SAIDI SQI-3

PSE proposes two changes to SQI-3: First, transition from the methodology referenced as IEEE Standard 2003 to the current IEEE Standard 2012. The move from the 2003 Standard to the 2012 Standard does not alter the measure, but simply puts in place what is most current.[7] Second, move the baseline required by WAC 480-100-388 from 2003 performance to 2014 performance. The baseline of 2003 is now 18 years old and there has been many new data and process methods changes and improvements which make 2003 technically not comparable. PSE's 2013 implementation of its Outage Management System ("OMS") and Customer Information System ("CIS") created substantial data changes, making trends before 2014 not valuable.

PSE does not propose any change to the current benchmark of 155. PSE's performance has been worse than this benchmark three times between 2017 and 2021. This benchmark was established in 2016 through robust discussions and calculations at the time that PSE completed the OMS/CIS project. Changing the benchmark would not be appropriate given PSE's performance. In place of a penalty, PSE provides the 24-hour service guarantee as agreed upon in 2016, which directly addresses customers impacted by reliability issues and PSE

[7] Per the IEEE 1366 Standard 2012, "The 2012 revision of the guide clarified several of the definitions and introduced two new indices. The new indices are CELID-s and CELID-t, customers experiencing long interruption durations (both single and total). A section was also added to explain the investigation of catastrophic days."

believes this mechanism continues to be the appropriate financial incentive for PSE.

<u>Update to SAIFI SQI-4</u>

PSE proposes three changes to SQI-4: 1) transition from the IEEE 1366 Standard 2003 to the IEEE 1366 Standard 2012 for similar reasons as described above; 2) align the SQI with $SAIDI_{TMEDADJ}$ as the new metric allows these measures to be compared and related better; and 3) move the baseline required by WAC 480-100-388 from 2003 performance to 2014 performance for similar reasons as described above.

With this change in the measurement, adjusting for catastrophic event days as $SAIDI_{SQI\text{-}3}$ does, PSE proposes that benchmark would change from 1.3 to 1.2. PSE's 2021 performance will be the first time PSE has exceeded this benchmark since 2017 and this SQI has a penalty associated with it. With the new calculation method, PSE proposes to monitor performance through the rate plan before any further reduction in the benchmark is made.

<u>Add SAIDI for Named Communities</u>

PSE proposes to add a measure of SAIDI for Named Communities which includes, as provided by CETA, Vulnerable Populations and Highly Impact Communities.[8] PSE will measure SAIDI for Vulnerable Populations and Highly

[8] Exh. JJJ-3 at 67-79 (Puget Sound Energy, *2021 PSE Clean Energy Implementation Plan* (Dec. 2021), at 51-63) ("Named populations include vulnerable populations and highly impacted communities, each with a specific definition derived from the CETA statute and subsequent rulemaking: HIGHLY IMPACTED COMMUNITIES: A

Impacted Communities separately as part of the CEIP but combine them for the purposes of the PSE Scorecard. Based on information of these groups provided by PSE's CEIP work, any circuit that serves either of these defined groups, even if it is just one customer or one foot of distribution line, will be defined as Named Population Circuit. PSE will determine the reliability performance experienced by all customers on these circuit recognizing that some specific customers may not be categorized by these definitions as PSE captures reliability most readily by circuit. Currently circuits within Named Communities are estimated to be about ~~400~~524. PSE will have to research data system improvements to tie specific customers to reliability data in the future. There are two measures: 1) $SAIDI_{NCTOTAL}$, similar to PSE's measure of $SAIDI_{TOTAL}$, which all outages for the single year, and 2) $SAIDI_{NCSQI\text{-}3}$ – Similar to PSE's $SAIDI_{SQI\text{-}3}$, which is system wide.

PSE does not propose any target or benchmark for these measures as of now as they are below PSE's system wide measures and would benefit from more stakeholder discussion of what the appropriate target would be if below PSE's system wide performance. Additionally, PSE will need time to integrate these designations and focus into the delivery system planning process in order to identify benefits and drive change in performance intentionally.

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community designated by the Department of Health based on the cumulative impact analysis required by RCW 19.405.140 or a community located in census tracts that are fully or partially on 'Indian country,' as defined in 18 U.S.C. Sec. 1151. VULNERABLE POPULATIONS: Communities that experience a disproportionate cumulative risk from environmental burdens due to: Adverse socioeconomic factors, including unemployment, high housing and transportation costs relative to income, access to food and health care, linguistic isolation, and sensitivity factors, such as low birth weight and higher rates of hospitalization.").

Add SAIFI for Named Communities

PSE proposes to add a measure of SAIFI for Named Communities similar to the proposal for SAIDI for Named Communities. There are two measures: 1) $SAIFI_{NCTOTAL}$, similar to PSE's measure of $SAIFI_{TOTAL}$, which all outages for the single year, and 2) $SAIFI_{NCSQI\text{-}4}$, similar to PSE's proposed $SAIFI_{SQI\text{-}4}$, which is system wide.

PSE does not propose any target or benchmark for these measure as of now as they are below PSE's system wide measures and would also benefit from more stakeholder discussion of what the appropriate target would be if below PSE's system wide performance. Additionally, PSE will need time to integrate these designations and focus into the delivery system planning process in order to identify benefits and drive change in performance intentionally.

Update to $SAIDI_{TOTAL}$ (SAIDI, All Outages, Single/Current Year) and $SAIDI_{IEEE}$; Update to $SAIFI_{TOTAL}$ (SAIFI, All Outages, Single/Current Year) and $SAIFI_{IEEE}$

These measures have not been deemed SQIs but are proposed to be tracked on the PSE Scorecard. PSE proposes two changes to these four measurements: 1) transition from the IEEE 1366 Standard 2003 to the IEEE 1366 Standard 2012 for similar reasons described above; and 2) move the baseline required by WAC 480-100-388 from 2003 performance to 2014 performance for similar reasons described above.

PSE does not propose any targets or benchmarks for these measures as they are informational and establishing targets against more than one measure (calculated differently) may result confusion as these drive infrastructure plans.

Remove SAIDI$_{\text{Total 5 year average}}$ and SAIDI5%; Remove SAIFI$_{\text{Total 5 year average}}$ and SAIFI5%

PSE proposes the removal of these four measurements which are reported as part of required Reliability Report per Docket UE-110060 and WAC 480-100-393. These measurements date back to 2003, but with the industry standardizing around IEEE methodology, they provide less and less value over time.

PSE requests the Commission remove these from PSE's current Reliability Reporting requirement.

Add AMI Metrics

PSE proposes to add four metrics to the PSE Scorecard as guided by the Commission's Final Order in Avista's 2020 General Rate Case, "Develop and propose AMI performance-based regulation metrics and measurements that the Commission might apply, and specifically such metrics and measurements for each of the use cases, above":[9] i) AMI Bill Read Success Rate – Electric; ii) AMI Bill Read Success Rate – Gas; iii) Remote Switch Success Rate; and iv) Reduced energy consumption from Voltage Reduction. I discuss these four metrics in Exh.

[9] *WUTC v. Avista Corp. d/b/a Avista Utilities*, Dockets UE-200900/UG-200901 et al., Final Order 08/05 ¶ 228 (Sept. 27, 2021).

CAK-7 and discuss measurements for the use cases the Commission discussed in the PSE's 2019 General Rate Case Final Order.

Q. Please describe investments to maintain customer and public safety.

A. Between July 1, 2021 and the end of the rate plan, PSE will repair the electric infrastructure in response to outages, forecasting an investment of over $308 million capital and $16 million OMRC in transmission and distribution infrastructure as a result of 16,000 to 17,000 outages annually. PSE will respond to natural gas odor calls and repair hazardous class A leaks, forecasting an investment of over $113 million capital in pipeline replacement as a result of 1,500 to 2,000 hazardous leaks annually.

Electric and gas relocations will need to be completed, and PSE forecasts an investment of $263 million capital in electric infrastructure replacement and $16 million OMRC and $100 million capital in gas infrastructure replacement as a result of 575 to 760 relocations annually, including relocation for 66 to 100 fish culverts, 20 Sound Transit projects, and an anticipated increase in transportation projects that will result from the Infrastructure Investment and Jobs Act.

Q. Please describe investments to meet customer growth and service needs.

A. Between July 1, 2021 and the end of the rate plan, PSE will continue to experience customer growth, forecasting an investment of over $257 million capital and over $4.5 million OMRC in ~~infrastructure for electric service~~responding to over ~~71,000~~104,400 customer~~s~~ requests and over $372 million capital in ~~infrastructure for natural gas service~~responding to over ~~56,000~~81,700 customer~~s~~ requests.

With this customer and load growth, PSE forecasts investing in over $60 million capital and $0.7 million OMRC, anticipating completion of 66 electric projects, avoiding the inability to serve almost four million MWh. Over this period, PSE's pipeline investments are based on addressing problems that have existed for several years, including load that has exceeded pipeline capacity, requiring PSE to implement cold weather actions or manual adjustments to avoid low pressure safety situations. There are no planned projects in this rate plan for pipeline capacity expansion.

Q. Please describe investments to modernize the grid, bringing clean energy that is reliable, resilient, smart, and flexible.

A. Between July 1, 2021 and the end of the rate plan, PSE will invest in deploying the programs and plans as described in Exh. CAK-5 to deliver defined benefits to customers. Decisions will be guided using key performance indicators such as avoided customer minutes of interruption along with monitoring tracker metrics such as miles of asset replaced or percentage of Worst Performing Circuit performance improvement, focused on the collection of plans to bring the greatest total program benefit while remaining within the overall program investment plan. Individual plan investments and benefits may flex as a result of adjustments due to schedule and cost and business decisions. By program, investments and benefits include:

1. **Grid Modernization – CEIP:** PSE forecasts investing $136 million capital to support the CEIP. Some of the benefits include implementing tools to operate and dispatch many DERs, integrate 22 MW of DERs through non-wires solutions and support over 30,000 MWh of avoided energy costs through Distribution Efficiency.

2. **Grid Modernization – Core:** PSE forecasts investing over $1,033 million capital and $11 million OMRC so the grid is reliable and resilient. PSE anticipates replacement of over 280 miles of failure prone direct bury cable, over 6,300 degraded poles, and installing over 5,800 additional assets. PSE forecasts improving circuit reliability performance of the defined worst performing circuits by more than 50 percent and investing in over 1,100 enhancements on additional circuits that will benefit from technologies like distribution automation, grid protection devices, and Substation SCADA, collectively avoiding an estimated 115 million customer minutes of interruption[10] relating to reliability. Relative to SQI benchmarks of $SAIDI_{SQI-3}$ <155 and $SAIFI_{SQI-4}$ < 1.3 (or 1.2 based on redefining the metric as described above), PSE expects to turn the corner on the degrading performance trend, performing close to or better than the 155 SAIDI benchmark and within the SAIFI benchmark by the end of the rate plan.

3. **Major Specific Electric Projects and Backbone Infrastructure:** PSE forecasts investing $422 million capital and $0.4 million OMRC so the electric backbone is strong and compliant with required NERC reliability standards, improving five transmission lines and two substations, and completing non-wire alternative analysis on several transmission needs to support PSE's clean energy targets.

Additionally, considering all 13 benefits valued through iDOT optimization, over $7,251 billion of benefits are associated with this electric portfolio.

Q. Please describe the investments to modernize the pipeline system, bringing clean energy that is safe and reliable.

A. Between July 1, 2021 and the end of the rate plan, PSE will invest in deploying the programs and plans as described in Exh. CAK-6 to deliver defined benefits to

[10] While PSE will monitor various tracker metrics, PSE initially proposes avoided customer minutes of interruption as the key performance indicator to prioritize when adjusting program plans when necessary.

customers. Decisions necessary for the business will be guided using one or two key performance indicators such as methane emissions reduction along with monitoring tracker metrics such as miles of asset replaced or leaks reduced, focused on the collection of plans to bring the greatest total program benefit while remaining within the overall program investment plan. Individual plan investments and benefits may flex as a result of adjustments due to schedule and cost and business decisions. By program, investments, and benefits include:

1. **Pipeline Replacement:** PSE forecasts investing $277 million capital to deliver the UTC approved 2021 Pipeline Replacement Plan and the anticipated 2023 Pipeline Replacement Plan. PSE anticipates addressing the highest risk infrastructure targeting 86 miles of Older Vintage PE pipe (a.k.a., DuPont), 62,845 failure risks associated with sewer cross bores and buried meter set assemblies, and implementing three methane reducing activities, reducing overall risk profile of PSE's pipeline system by 8.9 percent against a 2018 baseline.

2. **Pipeline Modernization:** PSE forecasts investing $175 million capital and $0.02 million OMRC to progress 29 targeted risk reduction programs. PSE will target 6,772 moderate to high failure risks, reducing overall pipeline system risk profile further by 8.4 percent and will aim to reduce greenhouse gases associated with pipelines and operational practices by preventing and eliminating 7,892 leaks, redefining design and construction processes, and adapting infrastructure to carry increased amounts of renewable natural gas and hydrogen to lower the carbon impact of pipeline energy. This program along with the Pipeline Replacement program anticipates methane emissions reduced by 23,255 CO_2 equivalent.

3. **Major Specific Gas Projects and Backbone Infrastructure:** PSE forecasts investing $53 million capital to provide pipeline system backbone reliability, completing eight projects that eliminate five cold weather action risks, and increases resiliency for Vashon and Gig Harbor gas customers.

Additionally, considering all 13 benefits valued through iDOT optimization, over $510 billion in benefits are associated with this gas portfolio.

Q. Please describe investments towards operational excellence and continuous improvement.

A. Between July 1, 2021 and the end of the rate plan, PSE will complete replacement of all Automated Meter Reading ("AMR") equipment with AMI, investing over $161 million capital to provide AMI service to over two million customers including additional growth over that period. AMI will deliver benefits before and by the end of the rate plan associated with core business case benefits of avoided AMR obsolescence investment, avoided energy costs for customers through conservation achieved through voltage reduction, and deploying distribution automation using the AMI network to avoid additional cellular fees, and setting the stage for benefits from an additional 35 use cases including the six use cases noted by the Commission in PSE's 2019 General Rate Case Final Order.[11] One significant focus in operational excellence is PSE's pursuit of the Operations Training Center, planned for completion in mid to late 2023.

Q. Please describe the new Operations Training Center to be built.

A. PSE will build a new 36,175 square foot Operations Training Center in North Bend, Washington. In addition to the main building, the center will include an outdoor covered training area and a simulated neighborhood to provide real life training experience for workers. This location is the best of 21 locations

[11] *WUTC v. Puget Sound Energy*, Dockets UE-190529/UG-190529 et al., Final Order 08/05/03 ¶ 157 (July 8, 2020) ("We encourage the Company to carefully review the report referenced in the Utility Dive article, which examined whether utilities are leveraging AMI by capturing data on six use cases: time of use rates, real-time energy use feedback for customers, behavior-based programs, data disaggregation, grid-interactive efficient buildings, and CVR or volt/VAR optimization.").

evaluated. It is centralized in PSE's service territory, allowing for training for not only PSE employees, but for the entire Northwest region such as engaging first responders in simulated emergencies and training scenarios. This new facility will serve two main purposes: 1) a training center for PSE's utility field employees and community first responders; and 2) as a place for PSE, its customers, energy contractors, facility managers, and developers to exchange ideas on energy efficiency. The training center integrates classroom, lab, hands-on, and scenario-based instruction for PSE technical and specialized training which is essential to meet the needs of the energy industry transformation. It will house training support resources and development activities, technology support and tools to provide distributed learning and support to employees using job aids, processes, and procedures that help employees know when, where, why, and how to work.

Q. Please describe the current status of this training center.

A. PSE is targeting construction completion for mid to late 2023. PSE's witness, Ms. Reyes, discusses the alternatives and selection process along with estimated cost and execution of this training center in more detail in Exh. DMR-1T. An RFQ was published October 29, 2021. PSE will review bids around the end of January 2022 and select a development partner. Once in agreement, PSE will secure least cost financing and fund the build of the training center. Exh. CAK-9 contains the CSA for the training center.

Q. Please describe the need for this training center.

A. PSE's current operating facilities have limited dedicated training spaces that make it difficult for PSE to properly train its employees. Current training spaces are carved out of small niches of space within business units and operating bases to "make do" and address a need. PSE is experiencing attrition in its workforce which is inhibiting PSE's ability to provide training in its traditional way. PSE needs to retrain existing and train future employees to operate technologies and infrastructure driven by grid modernization and clean energy. Proposed rulemaking such as the Pipeline and Hazardous Materials Safety Administration, FR Docket Number 2016-31461,[12] continue to refine training requirements that can best be implemented using the facilities provided by the new training center, including proper evaluation, quality assurance, performance feedback, and situational awareness simulations.

Q. Please describe why the traditional training approach no longer is effective.

A. In 2017, PSE participated in a training benchmark study, along with 34 other companies, conducted by The Mosaic Company, a utility consultant. The 2017 Energy & Utility Training Benchmark Report, provided as Exh. CAK-10, concluded the "energy and utility industry is facing an unprecedented level of

[12] Pipeline and Hazardous Materials Safety Administration, *Pipeline Safety: Operator Qualification, Cost Recovery, Accident and Incident Notification, and Other Pipeline Safety* Changes, 82 FR 7972, 49 CFR Parts 190, 191, 192, 195, 199 (Jan. 23, 2017) (This regulation was broken into three parts, two proceeded, and one relative to operator qualification training was delayed in 2017 but may move forward with this administration).

change, requiring a shift in the way organizations approach training."[13] It identified seven areas that were, and still are, placing pressure on field operations training, including aging workforce, millennial workforce, aging infrastructure/grid modernization, new technologies, regulatory requirements, operational cost pressures, and cost pressures on training, all of which PSE is experiencing like other utilities. Ten best practices were identified including competency-based training programs, structured on-the-job training programs, technology solutions for training delivery and on-the-job support, and dedicated training facilities that mirror real-world work. The report indicated that building a competent workforce is critical and matching this criticality with a strong Operations training is important. In 2018, GP Strategies performed a learning assessment for PSE of the current state of workforce development, technical training, and facility training practices to identify gaps and strengths within groups served by the Operations training department. The reality of the stated training pressures and PSE's known training gaps make the traditional decentralized, on-the-job, and after the fact approach ineffective at meeting the critical competent workforce need at the pace of change that is being experienced. This training center will create a safe environment for the learners to experience, observe, conceptualize, and experiment with the new knowledge for a more complete understanding of concepts and practices.

[13] Clint Morse & Rachel Collier, *2017 Energy & Utility Training Benchmark Report* (2017), at 2.

The real-time scenario training brings together first responders, electric utility workers, gas utility workers, and creates a near real-life experience with abnormal conditions in a controlled environment and demonstrates how integrated emergency response can be optimized and creates greater understanding of the inherent hazards of the utility facilities.

Q. What benefits does this training center provide for customers?

A. Customers benefit from a well-qualified workforce so that PSE's gas and electric infrastructure is operated safely and reliably. Public safety is a core value of this center allowing PSE to provide space and facilities to train and engage first responders in simulated emergencies, abnormal conditions, and training scenarios to increase public safety should an emergency or natural disaster occur. It will foster table top exercises for field, engineering, generation employees, and first responders regarding integrated emergency and disaster response including a space to conduct post-exercise debriefs and lessons learned. The center will also assist PSE to help members of the public understand pipeline and electricity safety through sharing information and visual/physical examples and scenarios over a range of topics including one-call damage prevention programs and sewer cross bore hazards.

Additionally, this center will be a direct laboratory for clean energy technology in terms of testing new equipment and development of procedures to operate these new technologies in the consistent safe and reliable manner expected from PSE.

VI. OPERATIONS AND MAINTENANCE EXPENSE SUPPORT PERFORMANCE OBJECTIVES

Q. Please describe the O&M work associated with operating an energy delivery system.

A. A majority of Operations O&M expense is associated with labor cost and benefits for the personnel/service providers that maintain and operate the electric and gas systems in a safe and reliable manner. These activities include emergency response for outages, odor calls, leaks, vegetation management, metering, property and easement maintenance, pipeline integrity mitigation, quality control, repair of damaged or leaking infrastructure, and patrols, inspections, and survey work.

Q. How does capital investment affect O&M spending?

A. In certain instances, capital investment has a direct effect on PSE's O&M expense as certain capital investments generate an associated O&M expense related to OMRC. As prescribed by FERC accounting practices under the Uniform System of Accounts, when certain construction activities take place, there is an associated O&M component. For example, when replacing a pole, the transferring of the existing conductor from the pole that is being removed to new pole is OMRC. The replacement of the pole is capital, but unless a foot or more of the conductor is replaced, the labor to move the conductor is an expense. The largest contributor to the total amount of OMRC is labor associated with the transfer of conductor. There is very little OMRC associated with pipeline investments.

Some investments increase PSE's O&M expense indirectly. For example, when PSE installs new assets where there were previously none, the result will be an increase in ongoing O&M expenses since the newly installed assets will need to be inspected and maintained. For pipelines this is required by regulation. Another example is when new customers are added, there is an increase in O&M for meter reading and maintenance.

Some investments save O&M expenses. For example, infrastructure that replaces existing failure prone assets (e.g., as part of aging infrastructure replacement programs) may result in a reduction in the ongoing maintenance costs in the near term on that particular part of the system (e.g., fewer leaks requiring monitoring or fewer unplanned power outages). Another example is where infrastructure is relocated from overhead to underground, tree trimming, and pole inspection and maintenance expenses are saved. A further example is where investments are made in control and monitoring equipment where outage detection can occur without or with fewer manual field visits or making "truck rolls" no longer necessary, which saves O&M. A final example is when pipeline capacity is increased to eliminate or reduce the use of manual field augmentation during peak conditions called "cold weather actions." This also saves O&M.

Another area of reduced O&M costs may be associated with a reduction in line losses as a result of replacing aging or undersized conductors.

Q. Does the Operations plan reduce O&M expenses?

A. Yes. PSE estimates that the grid modernization capital investments will reduce O&M expenses in total between approximately $4.3 million to $5.8 million from 2022 through 2025 and the pipeline modernization capital investments will reduce O&M expense in total by approximately $2.4 million.

Q. Does the Operations plan incur O&M expenses?

A. Yes. The capital investment, primarily related to electric infrastructure, requires an approximately $50 million in OMRC to implement between 2022 through 2025.

Q. Is there additional value to implementing the Operations plan than just considering O&M savings, given the OMRC expense required?

A. Yes. The value of grid modernization and pipeline modernization investments is driven primarily by avoided costs and other tangible valuable benefits such as avoiding outages that the utility and customers pay for in indirect ways. While the O&M savings may be overshadowed by the OMRC required, the O&M avoided can be significant. For example, the avoided O&M associated with the failing AMR system is $230 million as discussed in Exh. CAK-7. Another example is the avoided NERC compliance fines or customer outage cost should an unmaintained clearance between a tree and electrical line cause a cascading outage. A final example is the avoided cost of a pipeline incident because of not addressing a known integrity risk could be substantial. These costs are not accounted for in the

O&M plan and thus avoiding them does not result in a quantified reduction in O&M, but addressing these risks through the Operations investment plan is valuable for customers in direct and indirect ways.

Q. Are there other things that increase O&M expense?

A. Yes. Those mentioned (amount and age of assets and performance of assets) and other examples such as economic health, regulatory requirements, and cost escalators, drive upward pressure on O&M expense are as follows:

Amount and health of assets

- The addition of assets, more miles of main or more circuit miles, mean more inspection and maintenance such as leak surveys or patrols or more trees to trim (e.g., increase in the miles of infrastructure over the last ten years is 14 percent for pipeline infrastructure and five percent for electric infrastructure);
- As assets age, they inherently need more maintenance; for example, mains are more susceptible to corrosion over time (e.g., some pipeline facilities currently in service is over 50 years old, some electric facilities currently in service is over 80 years old);
- The addition of customers means more services to inspect, potential odor calls to respond to, or outages to handle in a storm; and
- Adding DERs requires more interconnection studies requiring more time and resources to be dedicated to meet required timelines (e.g., over 34 requests for interconnection is in the queue for PSE to study as of December 2021 versus eighteen in total in 2020).

Performance of the system

- Higher outage numbers due to tree growth and bird and animal populations means more emergency response (e.g., increase of over 1,000 in 2021 from previous year); and

- A pipeline system that does not have enough capacity may drive more cold weather actions in lieu of capital work (e.g., Gig Harbor LNG ran over 57 days in 2020 and total of 76 days during the winter of 2020/2021).

<u>Economic health</u>

- Increased construction activity when the economy is healthy unfortunately results in increased damage to infrastructure (i.e., third party excavation damage); and
- More remodels as a result of confidence in the economy or challenging new home market require more service disconnects and reconnects.

<u>Regulations</u>

- CETA brings increased expense for transforming and operating differently as provided in PSE's CEIP;
- The three phases of PHMSA's Gas Mega Rule, the bulk of which went into effect July 2020, modifies the definition of gas transmission, potentially increasing the miles of PSE pipeline categorized as transmission by five times as well as increasing the maintenance requirements (e.g., from approximately 30 miles to over 150 miles); and
- The PIPES Act shortens leak repair timelines and requires changes to operation and maintenance practices that cause methane emissions.

<u>Material and labor cost increases</u>

- Labor increases through negotiated contracts or compensation analysis (i.e., roughly ten percent increase in 2022 versus the three percent increase assumptions used to estimate costs in the planning process);
- Inflation beyond historical assumptions as discussed in Kensok, Exh. JAK-1T (e.g., some contractual increases of 7.8 percent inflation in 2022 versus the two percent increase assumptions used to estimate costs in the planning processes); and

- Long term permit costs associate with infrastructure on government lands and railroad that increase at periodic renewals (e.g., over last five years annual funding required has increased three times).

Operational practices

- Operating with alternative fuels and changing procedures to reduce methane emissions may add operational time and technology costs to bring environmental safety benefits;
- Operating and dispatching DERs will likely require more system operators and new electric distribution operational and maintenance practices;
- Additional inspection cost and vegetation management to reduce wildfire risk on circuits; and
- Future expansion of PSE's hazard tree removal work which I discuss in Exh. CAK-5.

Q. What is PSE doing to manage these increasing O&M expenses?

A. Kensok, Exh. JAK-1T, discusses how PSE manages the level of overall O&M expenses for PSE, matching expenses with customer growth. Mr. Kensok also discusses production savings from programs such as Be Excellent that help to offset increasing expenses. From a day-to-day standpoint, some examples of how PSE manages these expenses is through targeting reliability and pipeline safety plans that reduce unplanned outages and leaks, ensuring robust negotiations relative to contracts obligations, labor, materials, and permit fees, and through programs that proactively avoid costs such as PSE's focus on deterrents to occupation of or vandalism of PSE properties, a program that has reduced O&M expense associated with reoccurring clean up.

Q. Has PSE included the O&M savings associated with capital projects in its forecasts?

A. Yes. However, the O&M savings and aggressive day to day management efforts only partially offset the increasing O&M expense as described above. PSE will continue to have to prioritize O&M activities within the constraints of the current management required.

VII. CONCLUSION

Q. Does this conclude your prefiled direct testimony?

A. Yes, it does.